

UNITED STATES DISTRICT COURT
DISTRICT OF NEW JERSEY
CAMDEN VICINAGE

IN RE
PAULSBORO DERAILEMENT CASES

MASTER DOCKET NO.:
13-CV-784 (RBK/KMW)

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: 1-13-cv-04569-RBK-KMW (Johnson)
: 1:13-cv-05763-RBK-KMW (Truluck)
: 1:13-cv-07410-RBK-KMW (Smith)

**DEFENDANTS CONSOLIDATED RAIL CORPORATION, NORFOLK SOUTHERN
RAILWAY COMPANY AND CSX TRANSPORTATION, INC.'S MEMORANDUM OF
LAW IN SUPPORT OF MOTION TO EXCLUDE EXPERT REPORT AND
TESTIMONY OF PLAINTIFFS' EXPERT, PANOS G. GEORGOPOULOS, M.S., PH.D.**

Filed on behalf of Defendants,
Consolidated Rail Corporation,
Norfolk Southern Railway Company,
and CSX Transportation, Inc.

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COME NOW Defendants, Consolidated Rail Corporation, Norfolk Southern Railway Company, and CSX Transportation, Inc. ("Defendants"), by and through their counsel, Burns White LLC, and submit this Memorandum of Law in Support of Motion to Exclude Expert Report and Testimony of Plaintiffs' Expert, Panos G. Georgopolous, M.S., Ph.D.

Dr. Georgopolous' report and testimony fail to meet the applicable standards for admission of expert opinion evidence under federal law, particularly the admissibility standards set forth in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993). Accordingly, Dr. Georgopolous' proffered report and testimony should not be admitted into evidence at trial.

INTRODUCTION

Plaintiffs filed the instant lawsuits in this Honorable Court between December 6, 2012 and December 1, 2014, seeking damages arising out of a release of vinyl chloride as a result of a train derailment over the Mantua Creek in Paulsboro, New Jersey.

Plaintiffs' Complaints assert claims against Defendants for medical monitoring, negligence, nuisance, trespass, and punitive damages. With respect to the negligence claims, the Complaints allege, *inter alia*: (i) the Defendants owed a duty of care to the plaintiffs, and as a result of their acts and omissions, breached that duty of care, causing the bridge to collapse, the train to derail, and hazardous substances to be released into the air and water, causing damage to plaintiffs' person and property; (ii) the Defendants acted in a manner that was grossly inconsistent with the duty of care that they owed to the plaintiffs; and (iii) as a direct result of defendants' breach of their duty of care, plaintiffs have sustained damages to their persons and property. *See*, Plaintiffs' Complaints, generally.

In support of these claims, Plaintiffs have submitted the March 20, 2015 report of Panos G. Georgopolous, M.S., Ph.D., a professor in the Department of Environmental and Occupational Medicine at Robert Wood Johnson Medical School of Rutgers University (attached as Exhibit A; hereinafter "Report"). In his Report, Dr. Georgopolous performed an atmospheric modeling analysis to show "the magnitudes and spatiotemporal patterns of airborne concentrations of vinyl chloride, and of its atmospheric degradation products" resulting from the train derailment and chemical spill in Paulsboro, New Jersey on November 30, 2012. (Ex. A, at 1). He also prepared a model to estimate the hypothetical amounts of surface level airborne concentrations of vinyl chloride atmospheric degradation products following the derailment. (*Id.*, at 5). Defendants anticipate that Plaintiffs will offer Dr. Georgopolous' Report and testimony at trial to support their various claims of injuries due to alleged vinyl chloride exposure at the time

of the November 30, 2012 derailment, based upon the hypothetical “doses” of both vinyl chloride and its degradation products that were projected as part of Dr. Georgopolous’ model. To that end, Dr. Georgopolous’ Report estimates that Plaintiffs in Paulsboro were potentially exposed to vinyl chloride in amounts ranging from 0.1 ppm to in excess of 4000 ppm, and that formaldehyde and hydrochloric acid were the “major atmospheric decay products” of vinyl chloride involved in the derailment. (Ex. A, at 5-6).

Dr. Georgopolous’ opinions and testimony are not admissible pursuant to Fed. R. Evid. 702, the Supreme Court’s seminal decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (2003), and its progeny. Dr. Georgopolous is not qualified as an expert in the area of vinyl chloride modeling, and he failed to use available and relevant data to formulate his opinions. In addition, his estimated results are not reliable because they are inconsistent with actual monitoring data, and he used no valid scientific methodology with respect to the breakdown of vinyl chloride following the derailment. These profound deficiencies in Dr. Georgopolous’ Report and opinions are more than simply a subject for cross-examination, but call for their complete exclusion. Rather than provide a realistic model of the vinyl chloride dispersion through use of available data, Dr. Georgopolous’ professed fear of providing an “illusion of precision” has instead caused him to provide an “illusion of accuracy” with respect to his conclusions. Dr. Georgopolous himself admits to the limited accuracy of his modeling, which should be a sufficient basis upon which to exclude his Report and testimony.

Additionally, the probative value of the opinions set forth in Dr. Georgopolous’ Report and anticipated testimony is greatly outweighed by the probability that they will lead to unfair prejudice and jury confusion. For this additional reason, Dr. Georgopolous’ opinions, Report, and testimony should be excluded through application of Fed. R. Evid. 403.

**SUMMARY OF EXPERT'S
QUALIFICATIONS, OPINIONS AND METHODOLOGY**

I. Qualifications

Dr. Georgopolous is a professor in the Department of Environmental and Occupational Medicine at Robert Wood Johnson Medical School of Rutgers University, and works in Rutgers' Environmental and Occupational Health Science Institute. Dr. Georgopolous' education, training and qualifications are summarized in Dr. Georgopolous' *curriculum vitae* attached as Exhibit B.

II. Georgopolous' Conclusions And Methodology

Dr. Georgopolous' conclusions in his Report concerning the volume and movement of airborne concentrations of vinyl chloride and its atmospheric degradation products following the derailment are speculative at best. His methodology fails to incorporate available wind speeds and directions to model the likely drift and dispersion of the vinyl chloride, uses insufficient terrain resolution with respect to his claim that the vinyl chloride and its associated degradation products settled in Mantua Creek, and fails to account for actual atmospheric conditions with respect to the dispersion of both vinyl chloride and its degradation products. These flaws, when combined with the remainder of his analysis, render his estimated exposure levels in his Report artificially inflated and inaccurate. His modeling results are also completely inconsistent with available air monitoring data from the derailment. There is nothing in Dr. Georgopolous' methodology that would make his opinions helpful to a jury.

ARGUMENT AND CITATION OF AUTHORITIES

Dr. Georgopolous' Report and anticipated trial testimony should be excluded at trial, as the methodology supporting his causation opinions fails to meet the criteria for reliability and admissibility under Federal Rule of Evidence 402, 702, and *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993).

I. Standards For Evaluation Of A Motion To Exclude Expert Testimony

The opinion of a qualified expert witness is admissible if: (1) it is based on sufficient facts or data; (2) it is the product of reliable principles and methods; and (3) the expert has reliably applied the principles and methods to the facts of the case. Fed. R. Evid. 702. The expert's scientific, technical, or other specialized knowledge must also “help the trier of fact to understand the evidence or determine a fact in issue.” *Id.* The Court here is thus vested with a gatekeeping function, ensuring that “any and all scientific testimony or evidence admitted is not only relevant, but reliable.” *Daubert*, 509 U.S. at 589, 113 S.Ct. 2786. The Supreme Court identified in *Daubert* a number of factors that might assist the district court in determining the admissibility of expert evidence. *Id.* at 593–94. It instructed district courts to focus on “principles and methodology, not on the conclusions that they generate.” *Id.* at 595. Expert evidence may be excluded if “there is simply too great an analytical gap between the data and the opinion proffered.” *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997).

Although *Daubert* was decided in the context of scientific knowledge (whether evidence established a connection between the defendant's drug and birth defects), *Daubert* has since been extended to the kind of “technical or other specialized knowledge,” at issue here. *See Kumho Tire Co., Ltd. v. Carmichael*, 526 U.S. 137, 141 (1999). Under *Daubert* and its progeny, courts must address a “trilogy of restrictions” before permitting the admission of expert testimony: qualification, reliability and fit. *Schneider v. Fried*, 320 F.3d 396, 404 (3d Cir.2003); *see also Elcock v. Kmart Corp.*, 233 F.3d 734, 741 (3d Cir.2000). The party offering the expert must prove each of these requirements by a preponderance of the evidence. *In re TMI Litig.*, 193 F.3d 613, 663 (3d Cir.1999). First, to qualify as an expert, “Rule 702 requires the witness to have ‘specialized knowledge’ regarding the area of testimony.” *Betterbox Commc'ns Ltd. v. BB Techs., Inc.*, 300 F.3d 325, 335 (3d Cir.2002) (*quoting Waldorf v. Shuta*, 142 F.3d 601, 625 (3d

Cir.1998)). Second, the reliability requirement of *Daubert* “means that the expert's opinion must be based on the ‘methods and procedures of science’ rather than on ‘subjective belief or unsupported speculation’; the expert must have ‘good grounds’ for his or her belief.” *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 742 (3d Cir.1994) (“*Paoli II*”) (quoting *Daubert*, 509 U.S. at 590). In *Kumho Tire*, the Supreme Court held that the *Daubert* test of reliability is “flexible” and that “the law grants a district court the same broad latitude when it decides how to determine reliability as it enjoys in respect to its ultimate reliability determination.” 526 U.S. at 141–42 (emphasis omitted).

In determining whether the reliability requirement is met, courts examine the following factors where appropriate: (1) whether a method consists of a testable hypothesis; (2) whether the method has been subject to peer review; (3) the known or potential rate of error; (4) the existence and maintenance of standards controlling the technique's operation; (5) whether the method is generally accepted; (6) the relationship of the technique to methods which have been established to be reliable; (7) the qualifications of the expert witness testifying based on the methodology; and (8) the non-judicial uses to which the method has been put. *Mitchell*, 365 F.3d at 235 (citing *Paoli II*, 35 F.3d at 742 n. 8). These factors are neither exhaustive nor applicable in every case. *Kannankeril v. Terminix Int'l Inc.*, 128 F.3d 802, 806–07 (3d Cir.1997). Under the *Daubert* “reliability” prong, parties “do not have to demonstrate to the judge by a preponderance of the evidence that the assessments of their experts are correct, they only have to demonstrate by a preponderance of evidence that their opinions are reliable.” *Paoli II*, 35 F.3d at 744 (emphasis omitted). “The evidentiary requirement of reliability is lower than the merits standard of correctness.” *Id.* “As long as an expert's scientific testimony rests upon ‘good grounds, based on what is known,’ it should be tested by the adversary process—competing expert testimony and active cross-examination—rather than excluded from jurors' scrutiny for

fear that they will not grasp its complexities or satisfactorily weigh its inadequacies.” *Mitchell*, 365 F.3d at 244 (quoting *Ruiz–Troche v. Pepsi Cola of Puerto Rico Bottling Co.*, 161 F.3d 77, 85 (1st Cir.1998)).

Finally, for expert testimony to meet the *Daubert* “fit” requirement, it must “assist the trier of fact to understand the evidence or to determine a fact in issue.” Fed. R. Evid. 702. “This condition goes primarily to relevance. Expert testimony which does not relate to any issue in the case is not relevant and, ergo, non-helpful.” *Daubert*, 509 U.S. at 591 (citations and internal quotation marks omitted). “‘Fit’ is not always obvious, and scientific validity for one purpose is not necessarily scientific validity for other, unrelated purposes.” *Id.*

When the standard set forth by *Daubert* is applied in this case, it is clear that Dr. Georgopolous' proffered expert report and/or trial testimony should be barred because: (1) he is not an expert in the field of dense gas modeling; (2) his reasoning and methodology are not scientific; (3) his conclusions and opinions lack a factual foundation and will not serve to assist the jury in determining an issue at trial; and (4) whatever probative value Dr. Georgopolous' opinions may have are substantially outweighed by the likelihood that they will mislead and confuse the jury.

II. Dr. Georgopolous' Expert Opinions Are Not Admissible

- 1. Dr. Georgopolous' opinions should be excluded from the trial of this matter because he is not an expert in the field of dense gas modeling, and his reasoning and methodology are not scientific and do not meet the admissibility requirements under Federal law.**

A. Dr. Georgopolous is admittedly not an expert in the area of dense gas modeling, and he failed to use a model that accurately portrays the vinyl chloride release, thus he is not qualified to offer an expert opinion in this matter.

To qualify as an expert, “Rule 702 requires the witness to have ‘specialized knowledge’ regarding the area of testimony.” *Betterbox Commc'ns Ltd. v. BB Techs., Inc.*, 300 F.3d 325, 335

(3d Cir. 2002) (*quoting Waldorf v. Shuta*, 142 F.3d 601, 625 (3d Cir. 1998)). The Third Circuit has instructed courts to interpret the qualification requirement “liberally” and not to insist on a certain kind of degree or background when evaluating the qualifications of an expert. *See Waldorf*, 142 F.3d at 625. However, even in light of this liberal policy, it is clear the expert must still possess some specialized skill or knowledge that is relevant to opinions he wishes to offer and will assist the trier of fact. *See, e.g., Aloe Coal Co. v. Clark Equip. Co.*, 816 F.2d 110, 114 (3d Cir. 1987) (tractor salesman who prepared damages estimates not qualified to testify on cause of tractor fire); *Higginbotham v. Volkswagenwerk Aktiengesellschaft*, 551 F.Supp. 977, 982-983 (M.D.Pa. 1982) (investigating officer not qualified to offer opinion as to movement of body inside vehicle even though officer had experience as accident investigator, where officer had only minimal training in accident reconstruction, physics, and the movement of bodies), *aff’d mem*, 720 F.2d 669 (3d Cir. 1983); *Globe Indemnity Co. v. Highland Tank and Manufacturing Co.*, 345 F.Supp. 1290, 1291-1292 (E.D.Pa. 1972) (neither electrical engineer nor industrial hygienist was qualified to testify as an expert on the design of molasses storage tank, where neither witness had any prior experience or observational knowledge in the field of storage tank design), *aff’d mem*, 478 F.2d 1398 (3d Cir. 1973).

Dr. Georgopolous failed to consider a number of materials and data integral to a scientifically accurate portrayal of the potential levels of vinyl chloride exposure in Paulsboro following the derailment, likely due to his lack of experience with vinyl chloride. While Dr. Georgopolous has limited prior experience modeling various chemicals, he has never published in this area, and the work that he has performed did not involve vinyl chloride. (*See*, Transcript of Dr. Georgopolous’ April 30, 2012 deposition, attached as Exhibit C, at 46-47). He has never worked on any projects involving vinyl chloride. (*Id.*) The majority of Dr. Georgopolous’ professional work has been on ozone, and he has never published in the area of dense gases such

as vinyl chloride. (*Id.*, at 50-51). As an example of this unfamiliarity with vinyl chloride, Dr. Georgopolous noted that he modeled the release based upon his experience with nondense gases, “because if a dense gas is released in a small quantity, it’s not going to be very different than [sic] nondense gas.” (*Id.*, at 49). He was unable to offer any scientific support for this position, however. (*Id.*)

During his deposition, Dr. Georgopolous testified that modeling “is not an exact science.” (Ex. C, at 61:11-13). Dr. Georgopolous agreed that SCIPUFF, the model that he used:

[SCIPUFF] doesn’t try to get a *precise snapshot* because it recognizes the inherent sarcastic [sic] nature of the atmosphere and the other fluctuations that take place. So it provides *more of an average picture* of what happens by taking a statistical average over the *ensemble of potential realizations* of what happens.

Ex. C, at 55:4-9; emphasis added.

He further defends his choice of methodology by stating that SCIPUFF “gives you a range that most scientists working in the area feel is reliable”, but he provides no objective evidence of that claim. (*Id.*, at 55). He also insists that “we don’t have all the precise information that you would need for a more high-result model.” (*Id.*, at 56). He agrees that SCIPUFF is not approved by the EPA, but states he is not troubled by that because:

[t]hese models are usually more sophisticated than the models that are used, that is preferred. SCIPUFF has more options and it’s more scientifically complete than the models that are listed in the preferred area in the EPA site because not so many people are using them because it requires more [sic] of training and an understanding of the models.

Ex. C, at 123:6-15.

He testified that this “average” provided by SCIPUFF “gives you a range that most scientists working in the area feel is reliable.” (*Id.*) He testified that he did not look at any available air monitoring data from multiple sources, because “very limited monitoring took place following the incident.” (*Id.*, at 64-66). When pressed, he repeatedly stated that he did not rely

upon any of the data because he thought it was unreliable, although he had no basis for that claim. (*Id.*, at 150-154). Despite this patently untrue assertion, Dr. Georgopolous admitted that he did, in fact, compare his model with the “sporadic, the few measurements that we had, to see [sic] we are reasonably replicating them”, in essence not incorporating the data into his analysis because it was “flawed”, but then using it to test the accuracy of his model. (*Id.*, at 134-135). In light of this lack of experience with vinyl chloride, and the use of a model that grossly overestimates the dispersion of the vinyl chloride following the derailment, Dr. Georgopolous’ opinions reflect his lack of requisite expertise in the area of vinyl chloride modeling. He lacks the specialized knowledge needed to provide opinions in this matter pursuant to Rule 702, and his Report and opinions regarding vinyl chloride dispersion and estimated exposure levels must be excluded.

B. Dr. Georgopolous failed to incorporate readily available and highly relevant data in forming his opinions, thus his Report and opinions are inherently unreliable and should be excluded.

i. Dr. Georgopolous Failed to Account for Wind Speeds for 2 hours and 50 Minutes Following the Derailment

Dr. Georgopolous’ methodology with respect to use of available wind speeds is flawed. This methodological shortcoming caused Dr. Georgopolous’ model to completely miss the persistent eastward and then southward transport of the vinyl chloride for the first 90 minutes after the accident, and renders the results of that analysis to be wrong. (*See*, Declaration of Lloyd L. Schulman, Ph.D., attached as Exhibit D). His analysis improperly used hourly wind speeds and directions from four (4) area airports, which he then “averaged” together to model the transport and dispersion of the vinyl chloride, and he failed to use the available 2-minute average wind speeds and directions. (Ex. A, at 4). Under this approach, hourly averaged data for wind speeds less than 3 knots (about 3.5 miles per hour (mph)) is reported as calms. (Ex. D). As a

result of this manipulation of wind data, Dr. Georgopolous' model does not account for any prevailing wind for two hours and fifty minutes following the derailment. His model for this time period presents a vinyl chloride cloud "staying right there" over Paulsboro. (Ex. A, at 11-14).

In contrast, Dr. Georgopolous could have used readily available wind data from the nearest available airport, Philadelphia International Airport ("KPHL"), and used the available two minute average wind data, where speeds as low as 1 knot are reported along with their associated direction, in his model. (Ex. D). The actual winds measured and reported by the sonic anemometer every two minutes at KPHL indicated persistent winds out of the southwest and west for approximately the first 30 minutes after the accident, and then persistent winds out of the north for approximately an additional 60 minutes. (*Id.*) Wind speeds varied from 1 to 4 knots for any 2-minute period. (*Id.*). Thus, the wind speeds as established by KPHL were completely ignored, and Dr. Georgopolous' results are not representative of what occurred in Paulsboro.

Dr. Georgopolous' explanation for his methodology, which fails to account for any wind speed for two hours and fifty minutes, is also troubling. First, he stated that he "decided on using the hourly values because of the consistency." (Ex. C, at 116:17-19). He claims he did not use the available two-minute average wind speeds because "the two-minute fluctuating values were inconsistent in both speed and direction among the four stations in the area to define or to claim any prevailing wind direction." (*Id.*, at 116:19-24; Ex. D). However, this is contrary to Dr. Georgopolous' statement in his Report that "atmospheric conditions are consistent across the wider area" geographically encompassed by these four stations. (Ex. A, at 4).

Dr. Georgopolous' use of hourly average wind speed is arbitrary, and his methodology represents precisely the type of speculation and conjecture that *Daubert* and Rule 702 are meant to guard against, and they must be excluded. *See Daubert*, 509 U.S. at 590, ("[T]he word 'knowledge' connotes more than subjective belief or unsupported speculation."). The resultant

effect is a cloud hanging over the area for hours since there was no wind to disperse the cloud. It also results in a modeling picture that overestimates the length of time the “cloud” was present and the limited area in which it dispersed since there was no wind.

ii. Dr. Georgopolous’ Methodology Fails to Properly Account for The Thermodynamics of the Vinyl Chloride At the Time of the Release

The thermodynamics governing the vinyl chloride release represent the crux of Dr. Georgopolous’ conclusions in this matter, and yet his cavalier methodology in this area further demonstrates the unreliability of his Report and opinions. Dr. Georgopolous states that his modeling approach *assumes* that “the physics governing the release dictate that the major impact takes place in a short period immediately after the event.” (Ex. A, at 3; emphasis added). He opines that “the accident resulted in a large rupture that *should have led* to a very fast release of pressure, accompanied by similarly fast cooling and vaporization.” (*Id.*; emphasis added). Dr. Georgopolous’ model describes this post-release process as three (3) stages that a liquefied pressurized gas (such as vinyl chloride) goes through when it is released into the atmosphere, i.e., when the railroad tank car derailed and was breached, releasing vinyl chloride through the rupture in the car. (Ex. A, at 3). (*Id.*) He defines those stages as:

- i. In the first stage the liquefied gas flashes almost instantaneously and expands without premixing with atmospheric air and a cloud consisting of gas vapor and aerosol droplets is formed.
- ii. In the second stage, air is entrained in the cloud, causing mixing and further evaporation of the aerosol phase.
- iii. In the third stage, the aerosol has evaporated and the gas phase cloud disperses in the atmosphere.

Ex. A, at 3.

Dr. Georgopolous' Report fails to properly account for what he describes in his Report as Stage "i", the initial flash of liquefied gas at the time of the derailment. (Ex. D). During his deposition on this point, he stated that:

[i]t's, again, very difficult to make a correct estimate. There are models out there, and actually I did not report it because I did not do the calculation about reading about the minute for the first phase going from liquid to gas. I know—it can be anywhere from two to three up to 10 minutes."

Ex. C, at 82:1-9.

He made the assumption that the release was "instantaneous." (*Id.*, at 141:12). He "thinks" he considered 10 percent flash gas in the calculation, but stated at his deposition that "it doesn't matter. Let me put it this way: It doesn't matter." (*Id.*, at 141:19-22). As previously noted, Dr. Georgopolous' methodology continues to be completely indiscriminate, which is underscored by his comment.

Dr. Georgopolous also could not explain his methodology as to Stage "ii" of the dissipation of the vinyl chloride when it was exposed to atmosphere, which he describes in his Report as when "air is entrained in the cloud [of vinyl chloride]". (Ex. A, at 3). He states:

Q. How long is that stage [Stage "ii"]?

A. Again, that can be from a few seconds to a few minutes. It depends on the amount and the situation. But again, I would not expect the whole process to take more than, say, 10 minutes.

Q. I'm talking specifically about the Paulsboro situation.

A. Okay.

Q. Are you able to break down either the first or second stage in any more detail other than two to 10 minutes?

A. No. I did not try, because again, one can make assumptions about the rate of flow from the tank and so on, but because at the end, in order to calculate the later expansion of the cloud, it might make a few minutes of a difference of when you would realize a certain concentration...

Ex. C, at 83:3-24; 84:1-2.

Although Dr. Georgopolous testified repeatedly that he did not wish to make any assumptions, and was critical of other experts who do, he did in fact continue to make numerous, unsupported assumptions regarding Stages i and ii when he did his modeling for Stage iii, described in his Report as “the aerosol has evaporated and the gas cloud disperses in the atmosphere”. (Ex. A, at 3). He had to enter specific times of day of the derailment into his model to demonstrate how he opined that the vinyl chloride dispersed, as well his estimated vinyl chloride concentrations, and he testified that “initially I assumed that we then—I believe two minutes [sic] this was complete... But I *assumed* it was on the order of five minutes, the whole process.” (Ex. C, at 85-86; emphasis added). He could not recall specifically. (*Id.*, at 86).

As yet another example of the assumptions made by Dr. Georgopolous in reaching his opinions, he agreed that it would be difficult to estimate after the initial release how much of the liquid remaining in the breached car was water and how much was vinyl chloride- calculations that deeply impact the outcome of his model. (*Id.*, at 80-81). The liquid volume he used in his model (4,000 cubic meters of gas) was “the volume reported in the NTSB report, minus 10 percent.” (*Id.*, at 87). To represent the dimension of the vinyl chloride when it was released, Dr. Georgopolous assumed a size of 20 meters in horizontal dimension and 10 in the vertical, what he calls the “Gaussian spread parameter”, more commonly known as a bell curve, and made various other unidentified “assumptions” with respect to his volume dimensions, noting “there is nothing unusual in this type of calculation”, although he provides no scientific rationale for any of these assumptions. (*Id.*, at 88-89). He defended his assumptions as to volume and distribution by noting “I prefer to use rounded numbers whenever I could as an order of magnitude reflecting the lack of precise information about the whole process.” (*Id.*, at 90).

Dr. Georgopolous estimated all three stages of the post-release process, yet he was unable

to explain precisely how he did so. He also estimated the amount of vinyl chloride remaining in the tank car following the breach, and he arbitrarily selected a 20 meter by 10-meter dimension to represent the volume of the vinyl chloride when it was released. His methodology relies on assumptions, rather than facts, and is not scientific. Rule 702 jurisprudence recognizes that unsupported assumptions, unexplained or unjustified extrapolations, and leaps of faith or lapses in logic are badges of unreliable, speculative, and unscientific conclusions, and Dr. Georgopolous' Report and opinions must be excluded accordingly.

iii. Dr. Georgopolous' Methodology Fails to Properly Account for Terrain Variation In the Dispersion of the Vinyl Chloride Following the Derailment

Dr. Georgopolous' methodology is also flawed for failure to appropriately capture terrain variation in his model, which impacts the dissipation rate and movement of the vinyl chloride. (Ex. D). Vinyl chloride is a dense gas, and the methodology employed by Dr. Georgopolous was insufficient to appropriately capture and account for the settling of the vinyl chloride in the low lying areas of Mantua Creek. (*Id.*)

Dr. Georgopolous' model used terrain data with a resolution of approximately 1,500 meters per grid square- to a layperson, this means that Dr. Georgopolous' model would fail to account for the terrain near Mantua Creek that is near sea level, or even to accurately portray the Delaware River, a larger geographical feature. (Ex. A; Ex. D). Dr. Georgopolous' use of such a scale means that his model has only a limited ability to capture the "sheltering" of vinyl chloride that occurred in low lying areas, areas which act as a barrier to the movement of the vinyl chloride from Mantua Creek. (Ex. D). A 2009 conference paper confirms this limitation of the SCIPUFF model used by Dr. Georgopolous- a paper which is not included in Dr. Georgopolous'

Report.¹ His model employs a low resolution terrain file “that I used because there are no abrupt changes in the area, and because I would not have information to take into account manmade structures that would be more important than actual terrain in terms of changes in elevation of terrain.” (Ex. C, at 97:20-24; 98:1-3). He admits that his model does not capture the terrain difference between Mantua Creek and Paulsboro:

- Q. Does it capture the terrain of Mantua Creek?
- A. You mean the differential of Mantua Creek, say, versus the Philadelphia Airport two miles away? Yes, it does. They are two different elevations.
- Q. No, the difference between the Mantua Creek terrain and the town of Paulsboro?
- A. It captures it to the extent—I have to look exactly, but there is a linear slope because there is – every mile or so there’s a difference in elevation. So what is the difference between Mantua Creek and that one, there is-- there would be a corresponding scope [sic]. It doesn’t capture the details.”

Ex. C, at 98:23-24; 99:1-17.

The linear distance his model used for terrain was 8/10ths of a mile, which he readily admits does not accurately depict the terrain variations between Mantua Creek and Paulsboro. (*Id.*, at 99-100). He explains that discrepancy as “it’s just smoothened [sic] out, ... because we have to use an overall smoothened [sic] out representation of the area since I don’t have the information on how big the Refinery [sic], all the dimensions of the structures out there.” (*Id.*, at 100:13-18). He disagrees that his model is imprecise because he didn’t use a different terrain scale- he thinks it would have created “an illusion of precision”, a phrase he deployed repeatedly

¹ See, Hanna, S., R. Britter, J. Leung, O. Hansen, I. Sykes, P. Drivas, J. Weil, and D. Strimaitis. (2009). Source emissions and transport models for Toxic Industrial Chemicals (TIC) release in cities, Eighth Symposium of the Urban Environment, Paper J14.1, American Meteorological Society, Phoenix, AZ. Dr. Georgopolous is familiar with the work of Hanna and others, and cites two other studies led by Hanna in his Report. (Ex. A, at 61).

during his deposition when faced with a question regarding the lack of precision of his data or the results of his model. (*Id.*, at 102).

iv. **Dr. Georgopolous Failed to Test His Results Against Available Air Monitoring Data From the Derailment and His Report and Opinions Are Inherently Unreliable Because They Are Inconsistent With Actual Air Monitoring Data**

Dr. Georgopolous' methodology failed to consider air monitoring data despite it being available, and he claims that he did not use any available air monitoring data to "tune" his model or its results. (*Id.*, at 134). He confirmed during his deposition that he did not review any when preparing his model and report. (*Id.*, at 64). He claimed that "very limited monitoring took place following the incident", which belies the abundance of data collected by, among other agencies, the U.S. Environmental Protection Agency. (*Id.*, at 66). He agreed that for purposes of his modeling "all kinds of results, all kinds of information would be useful", and yet he did not review any available data. (*Id.*, at 69). Dr. Georgopolous remains completely inconsistent on this point, on one hand saying such data does not exist, but agreeing it would be useful, and then saying he did not have it.

Q. You start off by saying that there's very limited monitoring that took place, and then you talk about the NTSB references some monitoring, but you didn't look at that monitoring."

A. I did not have information on the specifics. Maybe information is out there, but I did not have that. I'm not sure.

Ex. C, at 69:19-24; 70:22-24; 71:1.

Although he claims in his testimony that some of the facts and figures cited in his Report, including reported levels of vinyl chloride in Paulsboro following the derailment, were from the NTSB Chairman's Factual Report, he could "not recall" if he looked at air monitoring cited by the NTSB in that same report. (*Id.*, at 66-67). He conceded, stating "I know I was trying to find

information about it, and there was [sic] no specifics, so maybe this is something that I missed.” (*Id.*, at 67).

He disagreed that available data (which he did not use) from close in time to the incident is more valuable than that farther in time- noting various things such as higher fluctuations at the beginning of the incident, moving to heavily loaded patches, and then stating that things get “diluted and homogenized.” (*Id.*, at 67-68). He testified that he thinks such data would be “useful”, but that it is “most difficult to interpret correctly”. (*Id.*, at 68). However, rather than try to interpret it correctly, even though “most difficult”, Dr. Georgopolous completely disregarded it instead.

1) Because Dr. Georgopolous Failed to Test His Results Against Available Air Monitoring Data From the Derailment, He Grossly Overestimates Potential Exposures to Vinyl Chloride

Dr. Georgopolous testified that that his model, by “providing reasonably conservative estimates” means the resulting measurements depicted in his Report are “*more probable to be on the high side.*” (*Id.*, at 136-137, emphasis added). He felt that his model was “*within a reasonable factor of two or three of reality.*” (*Id.*, emphasis added). Dr. Georgopolous stated that “a model, if it predicts within a systematically collected and appropriate set of data, a conservative model predicts within a factor of two or three, I would consider it acceptable as a tool for interpreting a situation.” (*Id.*, at 167).

When regard to specific data points from his model, as compared to actual air monitoring results, Dr. Georgopolous failed to consider the available data when he prepared his model. For example, VOC readings from the intersection of Delaware and Billings in Paulsboro at 8:44 a.m.

and 8:48 a.m. on November 30, 2012 were 193 ppm and 111 ppm, respectively.² (*See*, Paulsboro Refinery Air Monitoring, attached as Exhibit E). For that area, at that time, Dr. Georgopolous' model estimates exposures ranging from 400 ppm to 4,000 ppm. (Ex. C, at 142-147). Dr. Georgopolous noted that when multiplied by 1.9, that "nearly corresponds" with the lower end of his estimate. (*Id.*, at 148-149). That statement by Dr. Georgopolous is completely inaccurate, as demonstrated by a simple calculation:

$$193 \times 1.9 = 366.7$$

$$111 \times 1.9 = 210.9$$

These numbers do not "nearly correspond" to Dr. Georgopolous' estimated range of 400 ppm to in excess of 4,000 ppm, and he was unable to reconcile that discrepancy during his deposition. (Ex. C, at 148-149).

He was less confident of his estimates when reviewing data from the intersection of Roosevelt and Delaware, which showed 35 ppm at 9:00 a.m., and then fell to zero. (Ex. E). His data range for this intersection was 400 ppm to 4,000 ppm, and he agreed that the readings from the Refinery are inconsistent with his model. (Ex. C., at 150-151). He immediately qualified this admission, however, by asserting that "given the way these things are measured, I mean, I would not put much faith in the specific numbers." (*Id.*, at p. 150). When confronted with an additional reading of 0 ppm at 9:30 a.m. from Billingsport Road, he says "I don't believe it." (*Id.*, at 151). A reading taken at 9:40 a.m. at Billingsport Road and Broad Street was 0 ppm also failed to correspond to Dr. Georgopolous' model's reading of 400 ppm to 4,000 ppm. (Ex. A at 23; Ex. C at 153).

² "VOCs" represent the measurement of volatile organic compounds. In order to convert the "VOC" measurement to a vinyl chloride reading, the VOC measurement must be multiplied by a factor of 1.9.

Dr. Georgopolous continued to be critical of the air monitoring data he failed to use or consider in his modeling:

Q. So your position is that all of these numbers are off?

A. I don't know. I just don't think that it's been sufficient quality assurance [sic]."

Ex. C, at 152:2-6.

He ultimately agreed that none of his estimates corresponded with the Refinery data- and only one was possibly consistent and it was still twice as high as the actual measured reading. (*Id.*, at 153-4, emphasis added). Upon additional inquiry as to why he did not use the available air monitoring data, he reiterated his unfounded "quality assurance" concerns, and stated that had he had "reliable" data, he would have used it to tune his model. (*Id.*, at 154). He bases his assumption of inaccurate air monitoring data on a reference to instrumentation issues in the NTSB report, and states that he "did not undertake an evaluation of the measurements because obviously there was no prediction of the accident, there was no plan to do a systemic type of monitoring that would allow development of average values and distributions of measurement to have a comparison against a model that tries to predict a statistical average." (*Id.*, at 155).

The U.S. Environmental Protection Agency ("EPA") was one of many agencies that responded to the derailment, and began air monitoring shortly after their arrival to the scene. Dr. Georgopolous failed to use the available EPA data, and his Report inaccurately notes that the EPA data begins 6.5 hours after accident, and therefore does not capture the initial and most severe impact of the event. (Ex. A, at 2; Ex. C, at 157). Dr. Georgopolous agreed that he reviewed the NTSB Hazardous Materials Group Factual Report, which he conceded confirms that EPA monitoring started at 8:45 am, and the data from that monitoring by the EPA was included in the NTSB Hazardous Materials Group Factual Report. (Ex. C, at 160-161).

Inexplicably, even though Dr. Georgopolous reviewed the NTSB Hazardous Materials Group Factual Report, as well as the EPA data attached to it, he did not review the data in detail, and then he misstates the EPA's data in his Report. (*Id.*, at 161). He further agrees that the EPA data from 8:45 a.m. to 12:00 p.m. were all readings of 0 ppm, but he did not compare this data to his model, which he agrees is inconsistent with zeros. (*Id.*, at 162). Dr. Georgopolous cannot say whether the EPA data is wrong, noting "I assume they [EPA] must have a plan for performing their measurements." (*Id.*, at 163). He confirmed that his model was also inconsistent with data available from ExxonMobil, noting reading a reading at 10:40 a.m. of .2 ppm VOCs, and zeros for the remainder of the day, stating "I assume that these are lower than what the model has predicted". (*Id.*, at 164).

Despite his claim of limited data which is inaccurate, and his professed lack of faith in the quality of the air monitoring data, Dr. Georgopolous did in fact compare his model's results to available data. He conceded that he compared it with the "sporadic, the few measurements that we had, to see we are reasonably replicating them." (*Id.*, at 134-5). He compared his values to one high value specifically mentioned in the NTSB Hazardous Materials Group Factual Report, because he was "curious about how the model works. I don't take that to be a proof about the model. It's insufficient." (*Id.*, at 156). Dr. Georgopolous was only able to note two air samples that he believes are consistent with his model- two of the many taken by the Paulsboro Refinery and NuStar. (*Id.*, at 170, emphasis added).³ He agrees that "certainly I would like to consider in more detail to evaluate this—the data when they were collected and what is certain with them

³ Dr. Georgopolous also looked at data to try to correlate a report of smell with a level of vinyl chloride at 9:00 a.m., which is when it was reported. His estimate was 1,500 ppm- the odor detection limit of vinyl chloride from a study by Union Carbide in the 1970s. (Ex. C, at 172-173). He agreed that such information that would not stand alone as an indicator of the level of vinyl chloride present, and would defer to medical experts. (*Id.*, at 176).

before I make any conclusions or say that I would need to adjust something in the model.” (*Id.*, at 171).

2) Dr. Georgopolous’ Methodology Fails to Properly Estimate Potential Degradation Products of the Vinyl Chloride At the Time of the Release

Dr. Georgopolous’ conclusions regarding the atmospheric decomposition of vinyl chloride and its degradation products are likewise flawed. Dr. Georgopolous speculates that following the derailment, the released vinyl chloride would have decomposed into various other chemicals, and his report depicts the estimated concentrations of those various chemicals in Paulsboro during the 6 hours after the derailment. (Ex. A, at 27-32). He claims that those products would include hydrochloric acid, formaldehyde, formyl chloride, and acetylene, among a litany of chemicals listed in his Report. (Ex. A, at 5). While his actual analysis is vague as to the details surrounding the actual degradation process and its by products, the charts included in his Report paint a grim picture as to purported exposure levels, without incorporating any actual data in doing so.

However, Dr. Georgopolous is unable to cite to any scientific support of this position. During his deposition, when asked specifically if he could discuss any studies demonstrating that vinyl chloride would decompose into formyl chloride or hydrochloric acid in open-air conditions such as those present following the derailment, Dr. Georgopolous stated that he was “unaware of any done in atmospheric conditions.” (Ex. C, at 183:9-10). He finally conceded that there were no studies supporting his contention that the vinyl chloride released during the derailment would degrade into any of the substances referenced in his report, including formyl chloride or hydrochloric acid. (*Id.*, at 184:14-16). This is another glaring example of the lack of scientific support for the methodology used by Dr. Georgopolous in his Report.

Dr. Georgopolous is not qualified to offer expert testimony in the area of atmospheric modeling of vinyl chloride, and his inexperience is demonstrated through both his choice of methodology and his execution of same. His methodology, as set forth above, is scientifically unsound, and his Report and testimony and any opinions contained therein are unreliable and thus, not admissible under the standards established in *Daubert*. The SCIPUFF methodology employed by Dr. Georgopolous is a gross approximation that does not accurately reflect the dispersion of vinyl chloride following the derailment, and it fails to account for wind speeds for more than 2 hours and 50 minutes after the derailment. Further, Dr. Georgopolous' SCIPUFF model does not properly account for the thermodynamics of the vinyl chloride at the time of the release, and critically fails to consider terrain variation and its impact on the dispersion of the vinyl chloride following the derailment. Finally, despite the existence of abundant post-derailment air monitoring data, Dr. Georgopolous failed to test his results against that data, and his model vastly overestimates any potential exposure to vinyl chloride. Dr. Georgopolous failed to analyze various materials and data that would have likely led him to results much less favorable to Plaintiffs, and when pressed, variously claimed that a) there was no such data; b) if there was, he did not know about it, and c) if there was such and data and he did know about it, it was flawed. This continued prevaricating by Dr. Georgopolous demonstrates clearly that Dr. Georgopolous' Report, opinions, and testimony are completely unreliable and must be excluded.

III. The Probative Value Of Dr. Georgopolous' Opinions Is Outweighed By The Danger Of Unfair Prejudice, Confusion Of The Issues, And Misleading The Jury

Dr. Georgopolous' methodology is fatally flawed and his Report, testimony, and any opinions contained therein, are unreliable and thus, not admissible under the standards established in *Daubert*. The SCIPUFF model does not accurately reflect the dispersion of vinyl chloride following the derailment because Dr. Georgopolous failed to account for prevailing

wind speed and terrain variation, made unsupported assumptions regarding the thermodynamics of the release, and failed to test his model's results against contemporaneous air monitoring data. As such, Dr. Georgopolous vastly overestimates the potential vinyl chloride exposures of the Plaintiffs in this litigation, and his Report, opinions, and testimony must be excluded. Dr. Georgopolous' Report and/or testimony will not help to assist the jury in determining or understanding an issue during trial. His opinions are inconsistent with the evidence already established in this case, thus they are not admissible.

Pursuant to Rule 703, "[i]f the underlying data are so lacking in probative force and reliability that no reasonable expert could base an opinion on them, an opinion which rests entirely on them must be excluded." *Paoli II*, 35 F.3d at 748 (quoting *In re "Agent Orange" Product Liab. Lit.*, 611 F.Supp. 1223, 1245 (E.D.N.Y. 1985)). Dr. Georgopolous based his analysis and Report on speculative assumptions and failed to consider a vast array of available data reflecting actual conditions in Paulsboro following the derailment. His Report artificially inflates potential vinyl chloride exposure levels as a result, and overestimates potential exposure levels to assumed vinyl chloride degradation products. When data collected at the time of the derailment shows a reading of 35 ppm falling to zero several minutes later, but Dr. Georgopolous' data range for this same time and location was 400 ppm to 4,000 ppm, that is indeed "inconsistent" with his model, to say the least. (Ex. C, at 150-151). This is but one example of the glaring exaggeration of the vinyl chloride exposure levels that Dr. Georgopolous claims in his Report.

Federal Rule of Evidence 702 requires that expert testimony assist the jury in determining and/or understanding a fact at issue in the case. Dr. Georgopolous' speculative and shifting conclusions show that his Report and testimony will not be helpful in assisting a jury to determine a fact in issue. *Daubert*, 509 U.S. at 591. As noted before, a great deal of the "factual"

information assumed in Dr. Georgopolous' model and asserted in his Report and testimony fails to include a wide variety of available data as to the actual conditions existing in Paulsboro following the derailment, thus Dr. Georgopolous' opinions will not assist the jury in determining a fact at issue in this case.

Finally, it is clear that whatever slight probative value that Dr. Georgopolous' opinions regarding the likely vinyl chloride exposure levels in Paulsboro is substantially outweighed by the potential for unfair prejudice, confusion of issues and waste of time. Fed. R. Evid. 403. Fed. Rule Evid. 403 requires that evidence, although relevant, may still be excluded from trial, if its probative value is outweighed by the danger of unfair prejudice, confusion of the issues, and misleading the jury; and, in this case, the probative value of Dr. Georgopolous' opinions is clearly outweighed by these concerns. *McNabb v. Landis*, 223 Ga. App. 894, 896, 479 S.E.2d 194, 196 (1996). (Citation omitted); *see also In re Paoli Railroad Yard PCB Litigation*, 35 F.3d 717, 782-783 (3d. Cir. 1994) (when applying *Daubert* analysis, it is proper to utilize Fed. Rule Evid. 403 to exclude proffered expert testimony on grounds that possibility of unfair prejudice outweighed evidence's probative value), cert. denied, 513 U.S. 1190 (1995). Consideration of Dr. Georgopolous' unsupported opinions with respect to vinyl chloride exposure levels will deflect the jury's attention from consideration of the crucial determinations of whether Conrail's negligence, if any, caused the train derailment of November 30, 2012. For these reasons, the admission of Dr. Georgopolous' Report into evidence, or admission of his testimony at trial, would be unduly prejudicial to Defendants. Accordingly, it is clear that the probative value of Dr. Georgopolous' opinions is substantially outweighed by the considerations of Fed. Rule Evid. 403, and should be excluded from trial.

CONCLUSION

For the foregoing reasons, Defendants, Consolidated Rail Corporation, Norfolk Southern Railway Company and CSX Transportation, Inc., respectfully request that this Honorable Court exclude the proffered expert testimony of Panos G. Georgopolous, M.S., Ph.D. Defendants also request that the Court convene a *Daubert* evidentiary hearing on this Motion.

Respectfully Submitted,

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CERTIFICATE OF SERVICE

I hereby certify that on this 22nd st day of May, 2015, a copy of the within Memorandum in Support of Defendants Consolidated Rail Corporation, Norfolk Southern Railway Company and CSX Transportation Inc.'s Memorandum of Law in Support of *Daubert* Motion to Exclude Expert Testimony of Plaintiffs' Expert, Panos G. Georgopolous, M.S., Ph.D., was served on all counsel of record via efile.

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